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10/590,352	05/21/2007	Hans Van Der Laan	081468-0356680	8164

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EXAMINER	
TON, TRI T	

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2877	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/590,352	VAN DER LAAN ET AL.	
	Examiner	Art Unit	
	TRI T. TON	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 June 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16, 18-20, 22-37, 39-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16,18-20,22-33 and 37, 39-41* is/are rejected.

7)☒ Claim(s) *34-36* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 August 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see pages 1-5, filed 06/11/09, with respect to rejection(s) of claim(s) 1-12, 16-20, 22-33, 37, and 39-41 under Rejection – 35 USC 102(b) and 103(a) have been fully considered but are not persuasive.

2. With respect to applicant's arguments see pages 1-2, filed 06/11/09, with respect to the rejection(s) of claim(s) 1 and 22 under 102(b), Mieher et al. (Publication No. US 2003/0048458) discloses **shape parameter information and not shape parameters** being used for measurement data ([0080]).

Mieher discloses measurement spectra data being interpreted into shape parameter information ([0080], lines 1-3, figure 13, elements 306, (3)). Note that, shape parameter information of measurement spectra is an only type of spectral measurement data.

Applicants disclose the same matter as describe above, that is spectral measurement data being interpreted into shape parameter information (applicants' figure 4, element 402). Applicant's arguments page 3 states "measured calibration spectra, instead of theoretical spectral data, are directly used and compared with measured spectrum on an actual physical structure ..." wherein applicants' actual physical structure is shape parameter information which being disclosed in Mieher's reference.

Furthermore, Mieher clearly discloses employing the regression technique on the calibration measurement data ([0032], lines 1-6, [0036-0037, 0042-0043, 0052], [0080]).

With respect to applicant's arguments see page 4, a subject matter would be considered if and only if that subject matter being disclosed in the applicants' claims.

3. With further consideration, new rejection(s) under 101 has been added.

Claims 17, 21, 38, 42 have been cancelled.

Grounds for the rejection of claims 1-16, 18-20, 22-37, 39-41 are maintained and provided below.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 1-16, 18-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The claims are drawn to a method for determining at least one process parameter. A method for determining at least one process parameter is abstract instructions. Therefore, a method for determining at least one process parameter is not a physical thing nor a process as they are not "acts" being performed. As such, these claims are not directed to one of the statutory categories of invention (See MPEP 2106.01), but are directed to nonstatutory functional descriptive material.

It is noted that method for determining at least one process parameter embodied on an apparatus or other structure, which would permit the functionality of the program to be realized, would be directed to a product and be within a statutory category of invention, so long as the apparatus is not disclosed as non-statutory subject matter per se (signals or carrier waves).

Therefore, the method needs a physical transform would permit the functionality of the program to be realized. In other words, the method needs to tide to an apparatus to transform the steps "obtaining, determining, comparing, using".

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-12, 16-19, 22-33, and 37-40 are rejected under 35 U.S.C. 102(e) as being teached by Mieher et al. (Publication No. US 2003/0048458). Hereafter, "Mieher".

Regarding Claims 1, 22, Mieher teaches obtaining calibration spectral measurement data ([0044-0045]) from a plurality of calibration marker structure sets provided on a calibration object (paragraph [0032], lines 1-6), each of said plurality of calibration marker structure sets comprising at least one calibration marker structure ([0032], lines 6-17), calibration marker structures of different calibration marker structure sets being created using different known values of said at least one process parameter (paragraph [0032], lines 17-21, [0039], [0045], [0058]);

determining a mathematical model by using said known values of said at least one process parameter ([0056], [0060]), (equations model is not different from mathematical model) and by employing a multi-variant regression technique ([0080], lines 7-24) on said calibration spectral

measurement data (paragraph [0080]), said mathematical model comprising a number of regression coefficients (paragraphs [0061]-[0065] and [0066] lines 1-3);

obtaining spectral measurement data from at least one marker structure provided on a object ([0009]-[0010], [0037], lines 1-7), said at least one marker structure being made using an unknown value of said at least one process parameter ([0037], lines 4-17, [0058], [0060], [0088]);

comparing the obtained spectral measurement data with the calibration spectral measurement data ([0047], [0080], lines 7-13), to determine the unknown value ([0080], lines 12-13), (the error is reduced to the specified value) of said at least one process parameter for said substrate from said obtained spectral measurement data (paragraph [0008]) by employing said regression coefficients of said mathematical model (paragraph [0060], [0080], claims 16, 17); and

using the unknown value of said at least one process parameter for said object in the device manufacturing process ([0080-0090], figures 2-4).

Regarding Claims 2, 3, 23, 24, Mieher teaches calibration measurement data and said measurement data are obtained with an optical detector ([0048]), (it is obvious to have a scatterometry technique used to measure the grating structure having beams detected by using optical detector).

Regarding Claims 4, 25, Mieher teaches multi-variant regression technique used by the mathematical model is selected from a group consisting of principal component regression, non-linear principal component regression, partial least squares modeling and non-linear partial least squares modeling (paragraph [0080], lines 7-14).

Regarding Claims 5, 6, 26, 27, Mieher teaches substrate comprising one of the groups consisting of a test wafer and a product wafer (paragraph [0010], lines 3-5).

Regarding Claims 7, 28 Mieher teaches at least one marker structure being positioned on said substrate within one of the group consisting of a chip area and a scribe-lane (paragraph [0032], lines 4-17).

Regarding Claims 8, 29, Mieher teaches at least one marker structure being a part of a device pattern within a chip area (paragraph [0032], lines 4-17).

Regarding Claims 9, 30, Mieher teaches at least one marker structure comprising a diffraction grating (paragraph [0044], lines 9-12).

Regarding Claims 10, 31, Mieher teaches preprocessing the obtained calibration spectral measurement data ([0044]) and the obtained spectral measurement data before said employing said regression coefficients (paragraph [0037], [0080]).

Regarding Claims 11, 32, Mieher teaches preprocessing comprising performing on said data at least one of the group of mathematical operations consisting of subtraction of a mean, division by standard deviation, selection of optical parameters and weighing of optical parameters (paragraphs [0060]-[0068]), and wherein the optical parameters include at least one of the group of parameters consisting of wavelength, angle and polarization state (paragraph [0003]).

Regarding Claims 12, 33, Mieher teaches each of said plurality of calibration marker structure sets comprising at least a first and a different second calibration marker structure (paragraph [0008], lines 10-11).

Regarding Claims 16, 37, Mieher teaches at least one calibration structure within a calibration marker structure set and said marker structure have substantially comparable shapes (paragraphs [0032], [0044], lines 16-24).

Regarding Claims 18, 19, 39, 40, Mieher teaches method being related to at least one of a lithographic apparatus and a track ([0002]), and at least one process parameter is selected from a group consisting of focus, exposure dose, overlay error, track parameters related to dose, variation of line width over reticle, variations from reticle-to-reticle, projection lens aberrations, projection lens flare, and angular distribution of light illuminating the reticle (paragraph [0003]).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 20 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mieher et al. (Publication No. US 2003/0048458) in view of Bowley, Jr. et al. (U.S. Patent No. 6,917,901). Hereafter, "Mieher" and "Bowley".

Regarding Claims 20, 41, Mieher teaches an illumination system configured to provide a beam of radiation (paragraph [0002], lines 5-8);

the patterning structure serving to impart the beam of radiation with a pattern in its cross-section (paragraph [0002], lines 9-11);

a projection system configured to project the patterned beam onto a target portion of the substrate (paragraph [0002], lines 8-11).

However, Mieher does not teach a support structure and a substrate table. Bowley teaches a support structure configured to support a patterning structure (Figure 1, elements 110 and 120), (column 4, lines 49-53), a substrate table configured to hold the substrate (column 4, lines 54-57). It would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Mieher by adding a support structure and a substrate table for supporting the patterning structure and holding the substrate in order to improve the measurement process for a lithographic apparatus.

Allowable Subject Matter

10. Claims 34-36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The allowable Subject matter was indicated in office Action mailed on 09/04/2008.

Fax/Telephone Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tri T. Ton whose telephone number is (571) 272-9064. The examiner can normally be reached on 10:30am - 7:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on (571) 272-2059. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Gregory J. Toatley, Jr./
Supervisory Patent Examiner, Art Unit 2877

August 19, 2009
Examiner /TTT/